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**General Motors, LLC at Allison
Transmission**

Indianapolis, Indiana

Enhanced Hydraulic Control Interim Measures Work Plan

Plant 12 Former Degreaser Area (AOI 51) Plume
Extension

July 31, 2013



A handwritten signature in blue ink, appearing to be 'Eric Moosbrugger', written over a horizontal line.

Eric Moosbrugger, PE
Project Engineer

A handwritten signature in blue ink, appearing to be 'Mike Kladias', written over a horizontal line.

Mike Kladias
Technical Expert

A handwritten signature in blue ink, appearing to be 'Sarah Fisher', written over a horizontal line.

Sarah Fisher
Project Manager

**Enhanced Hydraulic Control
Interim Measures Work Plan**

Plant 12 Former Degreaser Area
(AOI 51) Plume Extension

Prepared for:
General Motors, LLC.

Prepared by:
ARCADIS U.S., Inc.
132 East Washington St
Suite 600
Indianapolis
Indiana 46204
Tel 317.231.6500
Fax 317.231.6514

Our Ref.:
IN000473.0020

Date:
July 31, 2013

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3	Aerial View (with Proposed Layout of Recovery Well and Discharge Line Indicated)

Attachments

A	Selected Cross Sections (with Recovery Well Indicated)
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Enhanced Hydraulic Containment Interim Measures Work Plan

Plant 12 Former Degreaser
Area (AOI 51) Plume
Extension

1. Introduction

The purpose of this Interim Measures Work Plan is to present a conceptual design for an enhancement to the existing hydraulic containment system located at Area of Interest (AOI) AOI 51 (Former Degreaser Area). The conceptual design calls for the addition of at least one additional recovery well, in the vicinity of MW-0102-S2, and this enhancement is consistent with the recommendations of the Corrective Measures Proposal (ARCADIS, June 2013). The modification is being performed to control any additional off-site migration of chlorinated volatile organic compound (CVOC) impacts in the groundwater near the southern property boundary (i.e., the Plume Extension), as identified in the Figure 2 and *Supplemental MW-0102-S2 Investigation Summary* (ARCADIS, October 2012), and to eliminate any continuing source of the Plume Extension. Any part of the Plume Extension that might be down-gradient from the capture zone of the proposed recovery well is expected to attenuate.

This conceptual design for the Plant 12 hydraulic containment system enhancement presents the following: 1) site background information, 2) technical basis for design, 3) conceptual system design, and 4) design verification testing objectives. This work plan includes a plan showing the proposed recovery well location and generalized process flow diagram of the proposed system components. For the purposes of this document, the language presented will assume the installation of one (1) new recovery well, however if site conditions are identified that indicate it is recommended, then additional recovery wells will be installed to ensure hydraulic control.

2. Background

A release of 8,000 gallons of PCE in the former heat treat area of Plant 12 was reported to the Indiana Department of Environmental Management (IDEM) on June 14, 1988. In July 2003, ARCADIS installed a soil vapor extraction system (SVE) and dense non-aqueous phase liquid (DNAPL) recovery system to remove PCE from the shallow soils and the groundwater in the vicinity of the former degreaser area. The systems began operation in October 2003. In February 2005, the DNAPL recovery system was shut down to allow for the installation of a groundwater recovery and treatment system, incorporating the six (6) source area wells and eight (8) down-gradient recovery wells. The source area wells are screened primarily in the S2A unit, with one well in the S3 unit, and the down-gradient recovery wells are screened primarily in the S2 and S3 units. The installation of the modified hydraulic containment system was completed for the down-gradient recovery wells on September 7, 2007, with the inclusion of the source area wells on November 28, 2007.

The Plume Extension in the S2 unit at the southern property boundary (encountered at approximately 20-35 feet below grade), near monitoring well MW-0102-S2 and between soil borings SB-51-1205 and SB-51-



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1206, is targeted for remediation by this Interim Measure. The Plume Extension is only observed in the S2 unit.

3. Technical Basis for Design

Since the 2007 installation and operation of the down-gradient recovery wells in the Plant 12 parking lot, a better understanding of the groundwater hydraulics in the Plant 12 parking lot has been obtained. This better understanding has primarily been the result of recent optimization activities, including the use of transducers in the well-field to obtain potentiometric data and generate potentiometric surface maps. Additionally, as part of the investigation activities related to the area at MW-0102-S2 that occurred in 2012, Mining Visualization Software (MVS) was used to create a 3D model of an area in and around the southern part of Plant 12 (Model Area). The MVS 3D model provided visualization and a better understanding of the geologic setting, as well as the groundwater and borehole water quality data (PCE, TCE and vinyl chloride) in the Model Area. The 3D model helps to clarify the hydrogeologic conceptual site model (HCSM) for the Model Area. Figure 1 presents an output from the 3D model that illustrates the modeled extent of PCE impacts and the location of the proposed recovery well. The MVS model was originally provided to EPA in December 2012. The data from the 2012 investigation which was used to generate the MVS model is presented as Figure 2, which also shows the additional proposed monitoring wells in the Plume Extension area (the proposed locations were approved for installation by EPA in March 2013).

During the development of the CMP, an analytical model was generated for the contaminant mass that has already migrated off-Site to the south. The conclusion from the groundwater transport assessment model (Appendix E of the Corrective Measures Proposal [ARCADIS, June 2013]) was that assuming continued operation of the up-gradient groundwater recovery system, additional off-Site plume migration, if any, is expected to be slow and the plume extension is likely stable.

Due to the complex geology in the vicinity of the area where the proposed additional recovery well is to be located (selected cross-sections are provided as Attachment A), a slug test will be performed on existing wells in the design area (MW-0421-S2, MW-0102-S2, and MW-1202-S2). This information will be used to help design the recovery well (desired flow rate, well diameter, screen size, sand pack, etc.), prior to bidding and installation.

Following the installation of the new recovery well for the Plant 12 down-gradient area, a short design verification field test will be conducted to confirm the system design parameters such as required pump and flow rate for the overall system. The design verification field test information will be used to determine final system equipment sizing specifications.



4. Conceptual System Enhancement Design

The conceptual design of the enhanced hydraulic containment system consists of the addition of one recovery well (or more, if indicated), sub-grade conveyance piping to the east remediation building, and related pump(s), flow meter, and controls (Figure 3). The current hydraulic containment system was designed with extra capacity and that capacity is not expected to be exceeded from this system enhancement. The flow rates from the new well will be confirmed during a design verification field test detailed in Section 5.

The conceptual design, as presented, may be subject to modification pending the results the proposed design verification field test. USEPA will be notified of any significant changes to the conceptual design presented herein. Pertinent assumptions regarding system components based on the pre-existing Plant 12 system design are detailed below:

- Area of influence for the recovery well to be determined using data from transducers in the surrounding monitoring well network.
- Recovery well construction will be based on slug testing and previous geotechnical analysis of the screened interval for appropriate well diameter, screen and sand pack selection. On March 6, 2012, a sieve analysis was performed on a sample from the saturated sand unit from the 22 to 28 feet bgs interval at soil boring SB-51-1102.
- The recovery well(s) will be connected to the existing treatment system via subsurface high-density polyethylene (HDPE) piping. The diameter of the piping will be determined based on engineering pressure loss calculations that will be completed after the slug testing, but prior to the proposed design verification field test.
- The proposed design verification field test described in Section 5 will be completed to confirm the appropriate flow rate and pump selection.

5. Design Verification Field Testing

After the installation of the recovery well, a short-term design verification field test will be conducted to develop the Site specific operational parameters. The design verification field test will have the following objectives:

- Characterize the hydraulic conductivity in the vicinity of the recovery well;
- Confirm flow and drawdown relationships in the vicinity of the recovery well;



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- Obtain pre-approval from the Town of Speedway Publicly-Owned Treatment Works (POTW), to treat and discharge the additional extracted groundwater from the field test through the existing treatment system.

After the design verification field test is completed, the data collected will be used to size equipment and verify piping size for the full scale system modification.

6. Estimated Schedule

TASK	ESTIMATED SCHEDULE
Task 1. Pre-Design Activities	
Perform slug testing in the design area	Within two weeks of USEPA approval of the Interim Measures Work Plan
Preparation of Well Design Documents	Within two weeks of performance of slug testing in the design area
Task 2. Well Installation	
Preparation of Well Installation Bid Documents	Within two weeks of completed well design activities
Evaluate bids and select subcontractor	Within four weeks of issuing bid documents
Complete well installation	Within four weeks of subcontractor selection
Task 3. Field Test and Bid Documents	
Perform the design verification field test and complete equipment sizing calculations	Within three weeks of completing well installation
Prepare system enhancement bid documents (earthwork, piping, controls, concrete, etc.)	Within three weeks of performing the design verification field test
Prepare and issue bid documents for system enhancement	Within two weeks of approving final design documents
Evaluate and select system enhancement subcontractor	Within three weeks of receipt of bids



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TASK	ESTIMATED SCHEDULE
Task 4. System Enhancement Installation	
Complete system enhancement installation and connection to existing treatment building	Within eight weeks of subcontractor selection
Complete system start-up and shakedown activities	Within two weeks of treatment building connection

The schedule is estimated and is dependent upon sub-contractor availability and a mutually agreed-upon schedule for access to the Allison Transmission, Inc. facility to conduct the on-site construction activities.

PCE CONCENTRATIONS IN GROUNDWATER

View from above
showing entire depth of
model

Tentative route of
proposed subsurface
piping pending review of
existing subsurface
utilities.

Pre-Existing
Treatment System
Buildings

Approximate Location of
Proposed Recovery Well

CONTOUR INTERVALS

PCE above 0.005 mg/L
PCE above 0.05 mg/L
PCE above 0.5 mg/L
PCE above 5.0 mg/L

PCE

44 mg/L

10 mg/L

1 mg/L

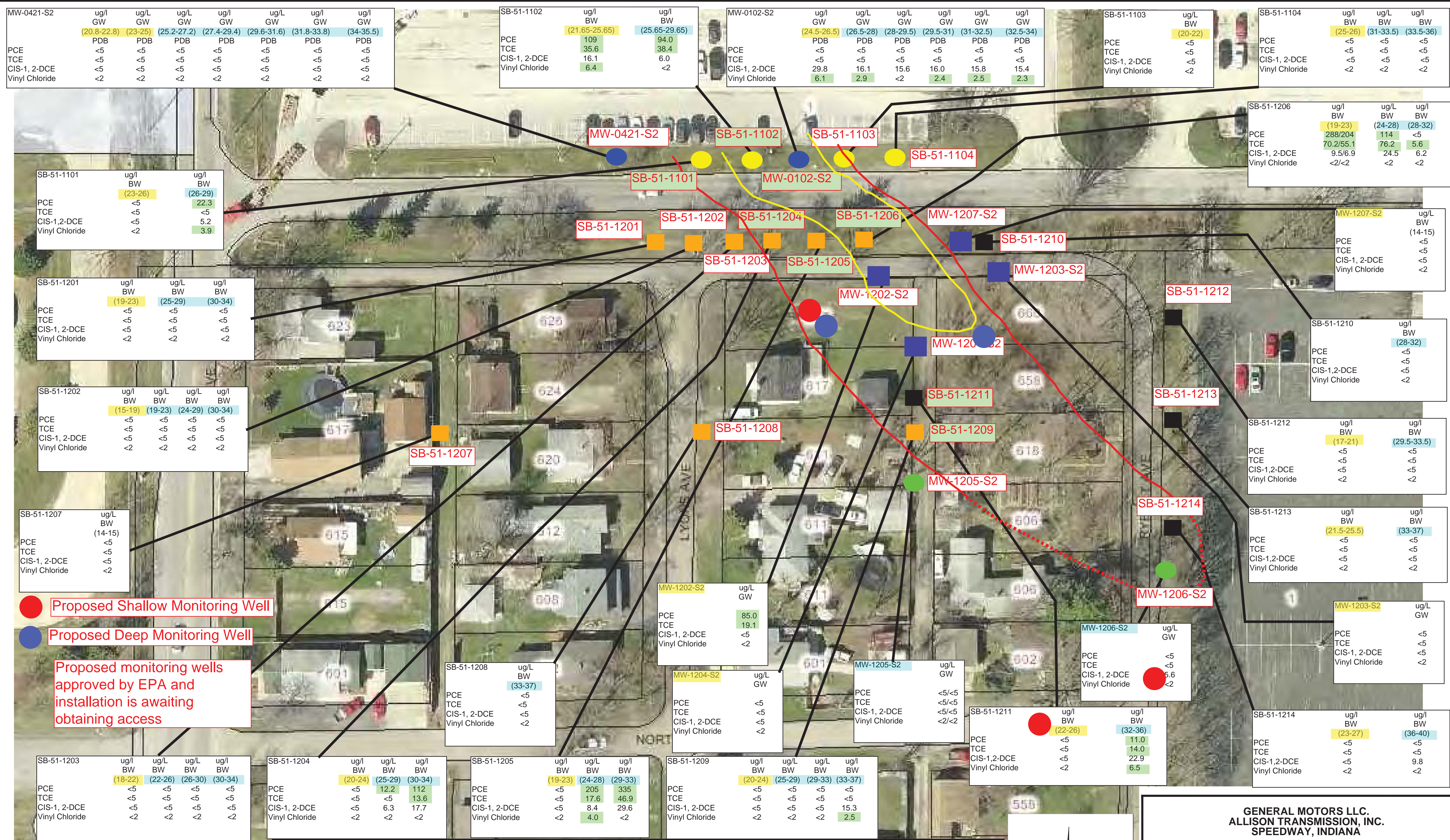
0.1 mg/L

0.01 mg/L

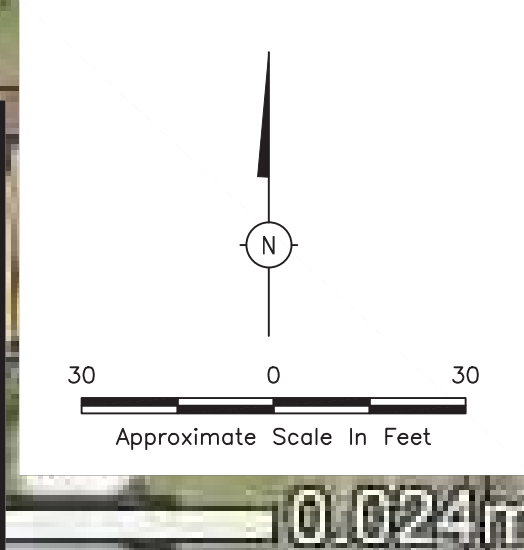
0.005 mg/L

Figure 1.
EVS Model with Proposed Layout of Recovery Well
and Discharge Line

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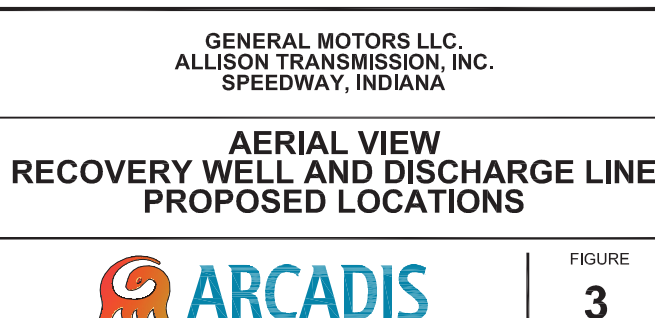


**GENERAL MOTORS LLC.
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA**

**AOI 51 SELECT VOC
ANALYTICAL RESULTS**

ARCADIS

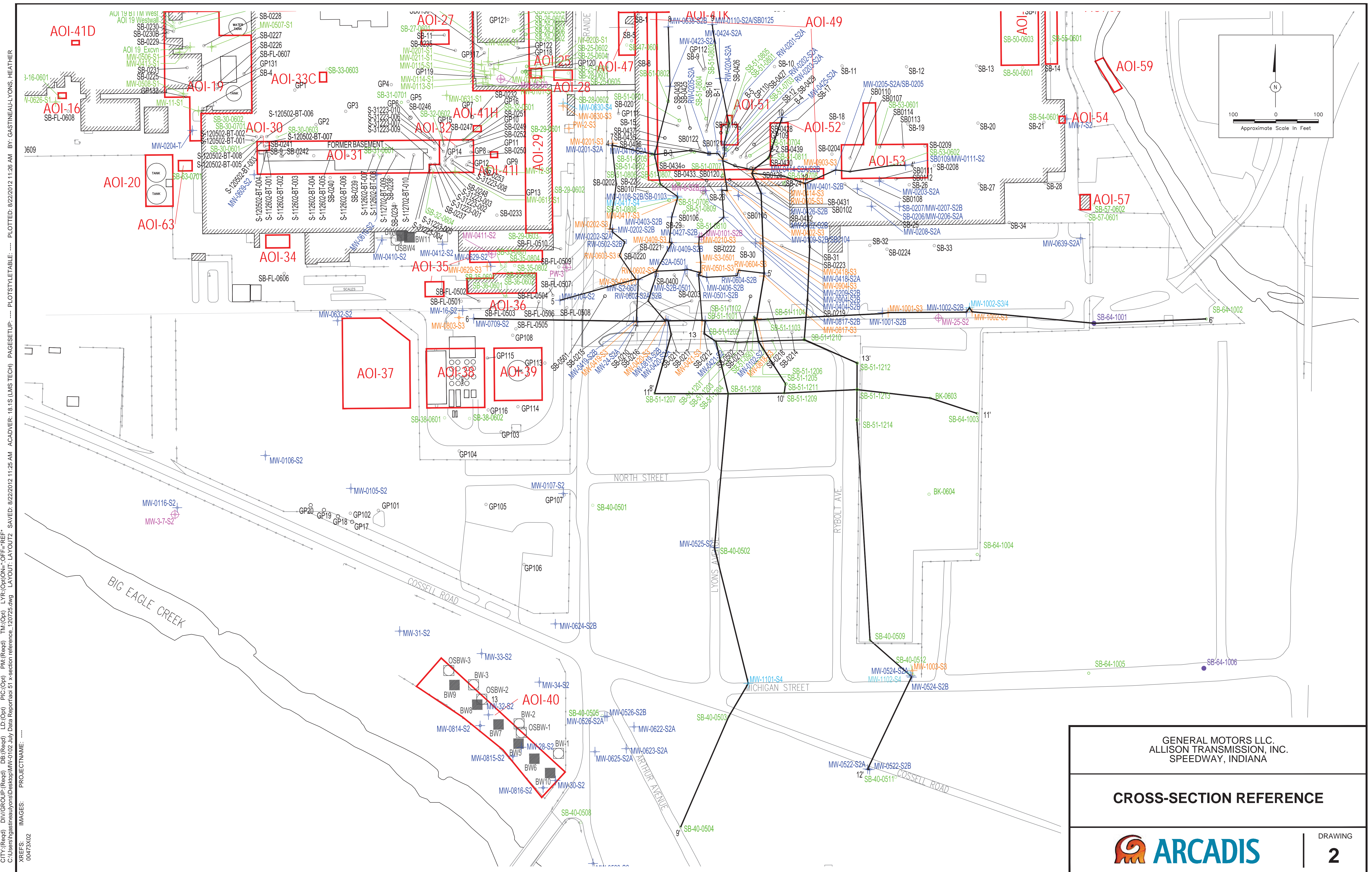
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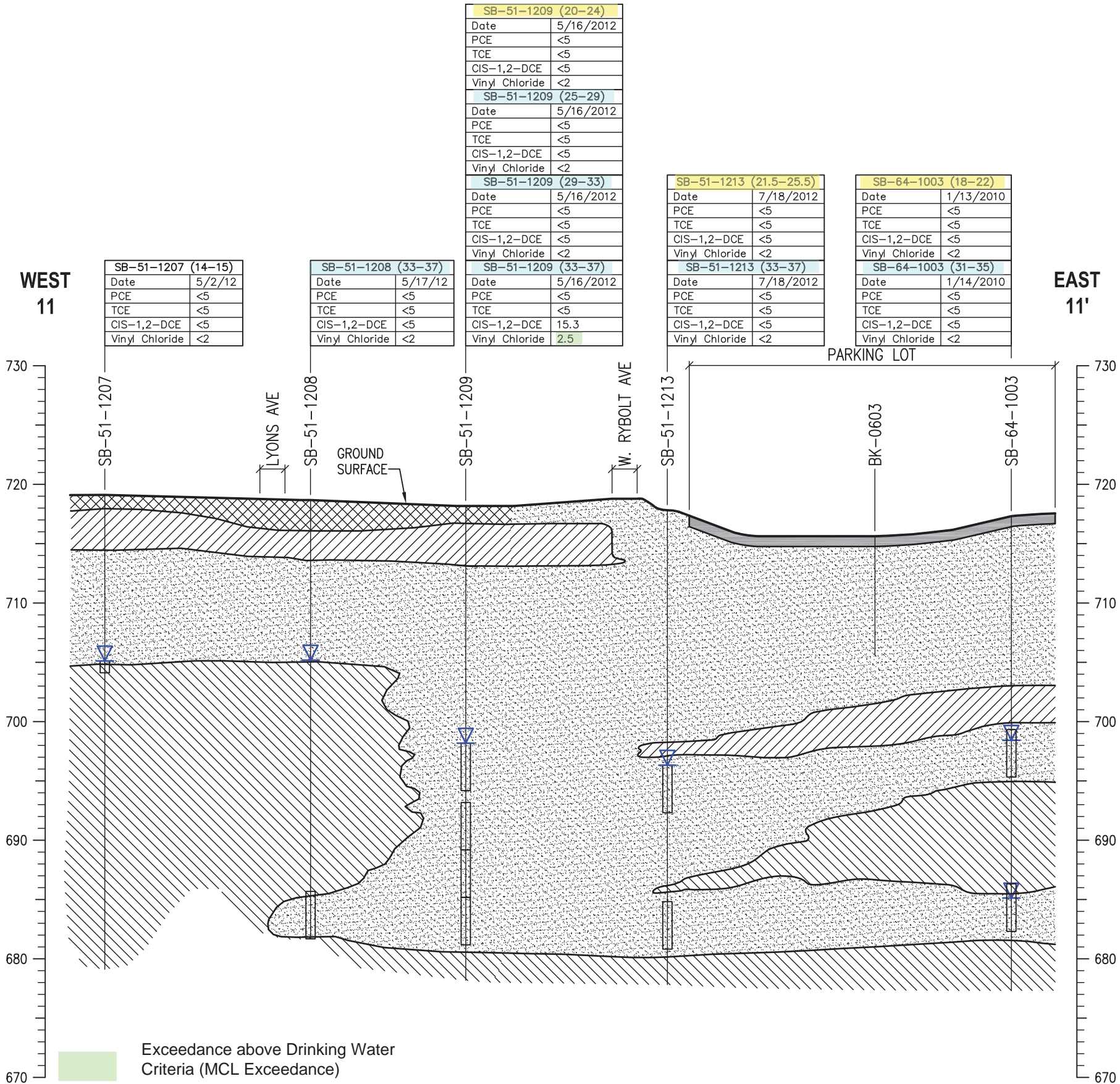










Attachment A

Selected Cross Sections
(with Recovery Well Indicated)

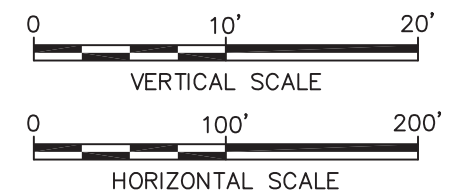




	FILL/TOPSOIL
	PLASTIC CLAY
	SAND
	TILL
	DEPTH OF BOREHOLE WATER ENCOUNTERED DURING DRILLING
	BOREHOLE WATER SAMPLE INTERVAL

Analytical result units are in ug/L.

SB-02-02-0704 USED GROUND SURFACE ELEVATION OF
SB-02-05-0601.



V.E. 10X

GENERAL MOTORS LLC
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA

CROSS SECTION 11 - 11'

DRAWING
10

